

## Product Overview

This NPN leaded metal device is RAD hard qualified for high-reliability applications per MIL-PRF-19500/391. Microchip also offers numerous other products to meet higher and lower power voltage regulation applications.

### Qualified Levels

- JANSE
- JANSK
- JANSU
- JANSM
- JANS D
- JANSP
- JANS L
- JANSR
- JANSF

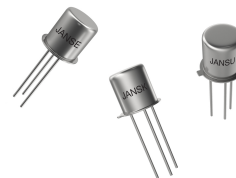
### Features

- JEDEC registered 2N3700
- RHA level JAN qualifications per MIL-PRF-19500/391 (see [Part Nomenclature](#) for all options)

### Applications/Benefits

- Leaded TO-18 package
- Lightweight
- Low power
- Military and other high-reliability applications

**Figure 1.** TO-18 (TO-206AA) Package



Also available in:

#### **UB package**

(leaded)

[JANS\\_2N3700UB](#)

#### **TO-39 (TO-205AD)**

(leaded)

[JANS\\_2N3019, 2N3019S](#)

#### **TO-46 (TO-206AB)**

(leaded)

[JANS\\_2N3057A](#)

## Table of Contents

|                                                |    |
|------------------------------------------------|----|
| Product Overview.....                          | 1  |
| 1. Maximum Ratings.....                        | 3  |
| 1.1. Mechanical Packaging.....                 | 3  |
| 2. Part Nomenclature.....                      | 4  |
| 2.1. Symbols and Definitions.....              | 4  |
| 3. Electrical Characteristics.....             | 5  |
| 4. Graphs.....                                 | 8  |
| 5. Package Dimensions.....                     | 9  |
| 6. Revision History.....                       | 11 |
| Microchip Information.....                     | 12 |
| The Microchip Website.....                     | 12 |
| Product Change Notification Service.....       | 12 |
| Customer Support.....                          | 12 |
| Microchip Devices Code Protection Feature..... | 12 |
| Legal Notice.....                              | 12 |
| Trademarks.....                                | 13 |
| Quality Management System.....                 | 14 |
| Worldwide Sales and Service.....               | 15 |

# 1. Maximum Ratings

**Table 1-1.** Maximum Ratings at 25 °C Unless Otherwise Noted

| Parameters/Test Conditions            | Symbol              | Value                      | Unit |
|---------------------------------------|---------------------|----------------------------|------|
| Junction and storage temperature      | $T_J$ and $T_{STG}$ | -65 to +200                | °C   |
| Thermal impedance junction-to-ambient | $R_{\theta JA}$     | 325                        | °C/W |
| Thermal impedance junction-to-case    | $R_{\theta JC}$     | 150                        | °C/W |
| Collector-Emitter voltage             | $V_{CEO}$           | 80                         | V    |
| Collector-Base voltage                | $V_{CBO}$           | 140                        | V    |
| Emitter-Base voltage                  | $V_{EBO}$           | 7.0                        | V    |
| Collector current                     | $I_C$               | 1.0                        | A    |
| Total power dissipation:              |                     |                            |      |
|                                       |                     | at $T_A = +25\text{ °C}^1$ |      |
|                                       |                     | at $T_C = +25\text{ °C}^2$ |      |
|                                       | $P_D$               | 0.5<br>1.0                 | W    |

**Notes:**

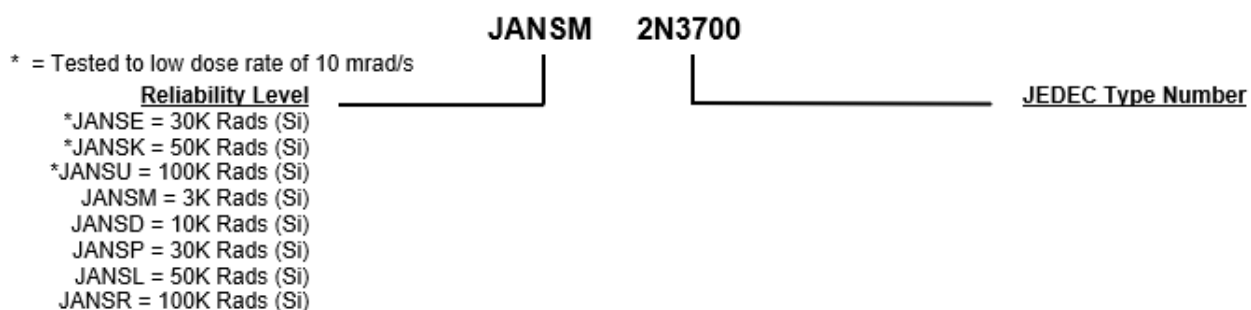
1. Derate linearly 2.85 mW/°C for  $T_A \geq +25\text{ °C}$ .
2. Derate linearly 10.3 mW/°C for  $T_C \geq +25\text{ °C}$ .

## 1.1 Mechanical Packaging

- Case: Hermetically sealed, nickel plated kovar base, nickel cap
- Terminals: Gold plate over nickel kovar
- Marking: Part number, date code, manufacturer's ID, and serial number
- Weight: Approximately 0.3 grams
- See [Package Dimensions](#).

## 2. Part Nomenclature

Figure 2-1. Part Nomenclature



### 2.1 Symbols and Definitions

Table 2-1. Symbols and Definitions

| Symbol          | Definition                        |
|-----------------|-----------------------------------|
| f               | Frequency                         |
| I <sub>B</sub>  | Base current (DC)                 |
| I <sub>E</sub>  | Emitter current (DC)              |
| T <sub>A</sub>  | Ambient temperature               |
| T <sub>C</sub>  | Case temperature                  |
| V <sub>CB</sub> | Collector to base voltage (DC)    |
| V <sub>CE</sub> | Collector to emitter voltage (DC) |
| V <sub>EB</sub> | Emitter to base voltage (DC)      |

### 3. Electrical Characteristics

**Table 3-1.** Electrical Characteristics at 25 °C Unless Otherwise Stated

| Parameters / Test Conditions                                                                                                                                                                                                                                          | Symbol        | Min.                        | Max.              | Unit           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------|-------------------|----------------|
| <b>Off Characteristics</b>                                                                                                                                                                                                                                            |               |                             |                   |                |
| Collector-Emitter breakdown current<br>$I_C = 30 \text{ mA}$                                                                                                                                                                                                          | $V_{(BR)CEO}$ | 80                          | —                 | V              |
| Collector-Base cutoff current<br>$V_{CB} = 140\text{V}$                                                                                                                                                                                                               | $I_{CBO}$     | —                           | 10                | $\mu\text{A}$  |
| Emitter-Base cutoff current<br>$V_{EB} = 7\text{V}$                                                                                                                                                                                                                   | $I_{EBO1}$    | —                           | 10                | $\mu\text{A}$  |
| Collector-Emitter cutoff current<br>$V_{CE} = 90\text{V}$                                                                                                                                                                                                             | $I_{CES}$     | —                           | 10                | $\eta\text{A}$ |
| Emitter-Base cutoff current<br>$V_{EB} = 5.0\text{V}$                                                                                                                                                                                                                 | $I_{EBO2}$    | —                           | 10                | $\eta\text{A}$ |
| <b>On Characteristics<sup>1</sup></b>                                                                                                                                                                                                                                 |               |                             |                   |                |
| Forward-Current transfer ratio<br>$I_C = 150 \text{ mA}, V_{CE} = 10\text{V}$<br>$I_C = 0.1 \text{ mA}, V_{CE} = 10\text{V}$<br>$I_C = 10 \text{ mA}, V_{CE} = 10\text{V}$<br>$I_C = 500 \text{ mA}, V_{CE} = 10\text{V}$<br>$I_C = 1.0\text{A}, V_{CE} = 10\text{V}$ | $h_{FE}$      | 100<br>50<br>90<br>50<br>15 | 300<br>300<br>300 | —              |
| Collector-Emitter saturation voltage<br>$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$<br>$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$                                                                                                                                    | $V_{CE(sat)}$ | —                           | 0.2<br>0.5        | V              |
| Base-Emitter saturation voltage<br>$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$                                                                                                                                                                                        | $V_{BE(sat)}$ | —                           | 1.1               | V              |

**Note:**

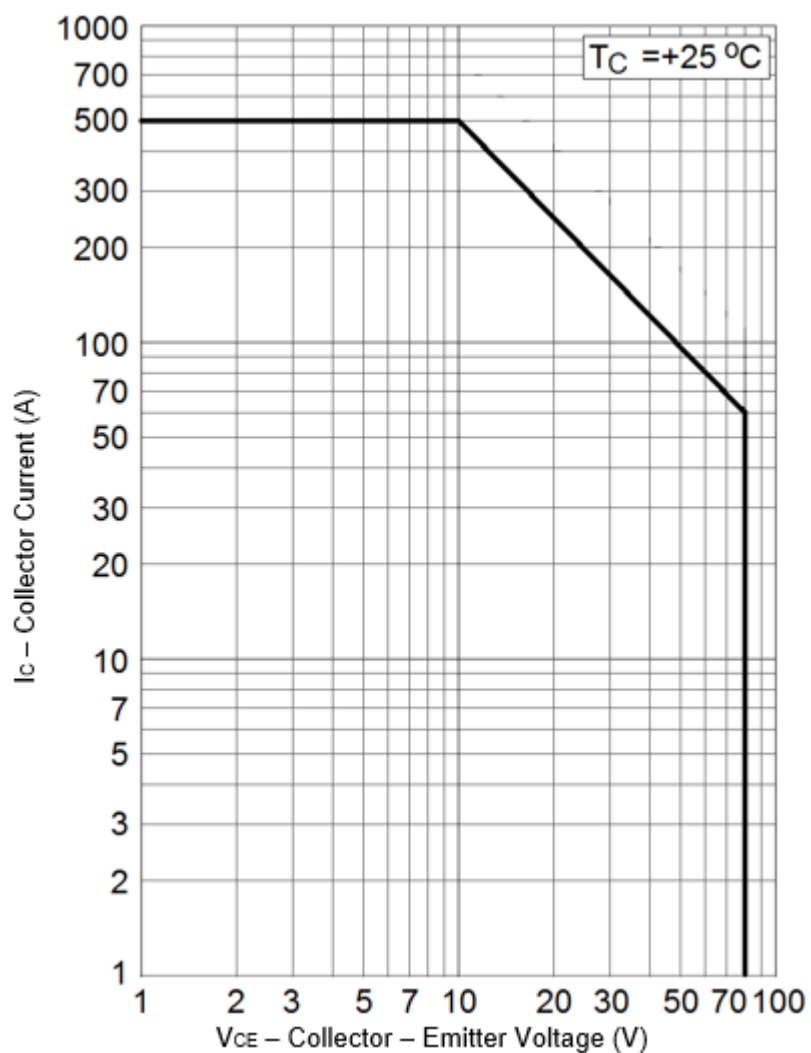
1. Pulse Test: pulse width = 300  $\mu\text{s}$ , duty cycle  $\leq 2.0\%$

**Table 3-2.** Dynamic Characteristics

| Parameters / Test Conditions                                                                                                            | Symbol     | Min. | Max. | Unit |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------|------|------|------|
| Small-Signal short-circuit forward current transfer ratio<br>$I_C = 1.0 \text{ mA}, V_{CE} = 5.0\text{V}, f = 1.0 \text{ kHz}$          | $h_{fe}$   | 80   | 400  | —    |
| Magnitude of small-signal short-circuit forward current Transfer Ratio<br>$I_C = 50 \text{ mA}, V_{CE} = 1\text{V}, f = 20 \text{ MHz}$ | $ h_{fe} $ | 5.0  | 20   | —    |
| Output capacitance<br>$V_{CB} = 10\text{V}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                                       | $C_{obo}$  | —    | 12   | pF   |
| Input capacitance<br>$V_{EB} = 0.5\text{V}, I_C = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                                       | $C_{ibo}$  | —    | 60   | pF   |

**Table 3-3.** Safe Operation Area (See the following SOA graph and [MIL-STD-750, Method 3053](#))

| DC Tests                                                         |                                                 |
|------------------------------------------------------------------|-------------------------------------------------|
| $T_C = 25\text{ }^{\circ}\text{C}$ , 1 cycle, $t = 10\text{ ms}$ |                                                 |
| <b>Test 1</b><br>2N3700                                          | $V_{CE} = 10\text{V}$<br>$I_C = 180\text{ mA}$  |
| <b>Test 2</b><br>2N3700                                          | $V_{CE} = 40\text{V}$<br>$I_C = 45\text{ mA}$   |
| <b>Test 3</b><br>2N3700                                          | $V_{CE} = 80\text{V}$<br>$I_C = 22.5\text{ mA}$ |

**Figure 3-1.** Maximum Safe Operating Area

**Table 3-4.** Post Radiation Electrical Characteristics

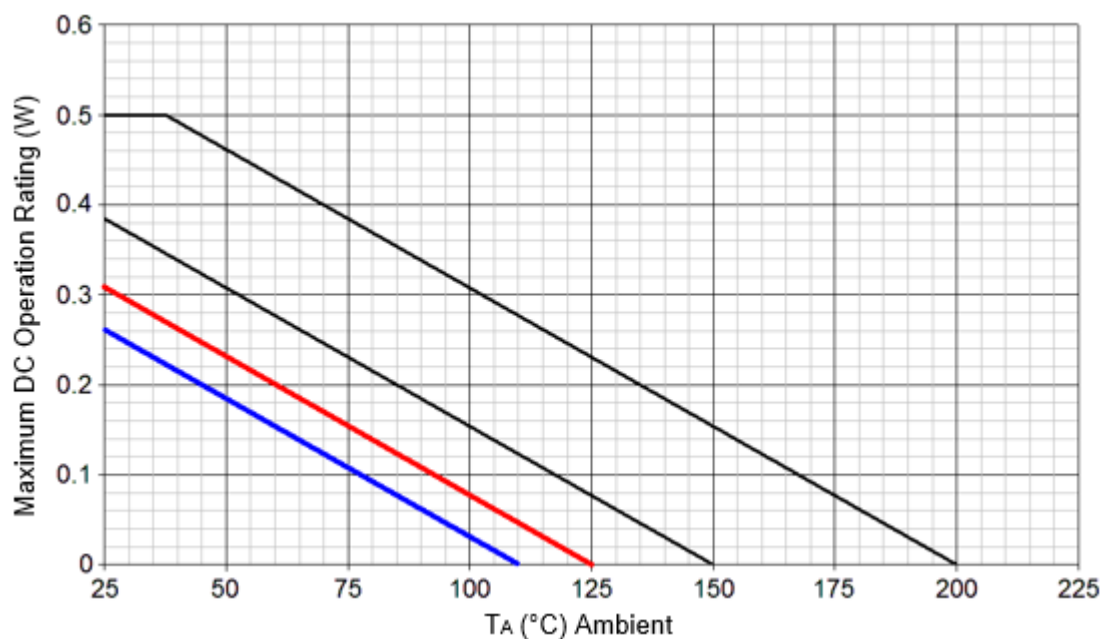
| Parameters / Test Conditions                                                                                                                                                                                                       | Symbol        | Min.                                  | Max.                        | Unit     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------|-----------------------------|----------|
| Collector to base cutoff current<br>$V_{CB} = 140V$                                                                                                                                                                                | $I_{CBO}$     | —                                     | 20                          | $\mu A$  |
| Emitter to base cutoff current<br>$V_{EB} = 7V$                                                                                                                                                                                    | $I_{EBO}$     | —                                     | 20                          | $\mu A$  |
| Collector to emitter breakdown voltage<br>$I_C = 30\text{ mA}$                                                                                                                                                                     | $V_{(BR)CEO}$ | 80                                    | —                           | V        |
| Collector-Emitter cutoff current<br>$V_{CE} = 90V$                                                                                                                                                                                 | $I_{CES}$     | —                                     | 20                          | $\eta A$ |
| Emitter-Base cutoff current<br>$V_{EB} = 5.0V$                                                                                                                                                                                     | $I_{EBO}$     | —                                     | 20                          | $\eta A$ |
| Forward-Current transfer ratio <sup>1</sup><br>$I_C = 150\text{ mA}, V_{CE} = 10V$<br>$I_C = 0.1\text{ mA}, V_{CE} = 10V$<br>$I_C = 10\text{ mA}, V_{CE} = 10V$<br>$I_C = 500\text{ mA}, V_{CE} = 10V$<br>$I_C = 1A, V_{CE} = 10V$ | $[h_{FE}]$    | [50]<br>[25]<br>[45]<br>[25]<br>[7.5] | 300<br>300<br>—<br>300<br>— | —        |
| Collector-Emitter saturation voltage<br>$I_C = 150\text{ mA}, I_B = 15\text{ mA}$<br>$I_C = 500\text{ mA}, I_B = 50\text{ mA}$                                                                                                     | $V_{CE(sat)}$ | —                                     | 0.23<br>0.58                | V        |
| Base-Emitter saturation voltage<br>$I_C = 150\text{ mA}, I_B = 15\text{ mA}$                                                                                                                                                       | $V_{BE(sat)}$ | —                                     | 1.27                        | V        |

**Note:**

- See method 1019 of MIL-STD-750 for how to determine  $[h_{FE}]$  by first calculating the delta ( $1/h_{FE}$ ) from the pre- and post-radiation  $h_{FE}$ . Notice the  $[h_{FE}]$  is not the same as  $h_{FE}$  and cannot be measured directly. The  $[h_{FE}]$  value can never exceed the pre-radiation minimum  $h_{FE}$  that it is based upon.

## 4. Graphs

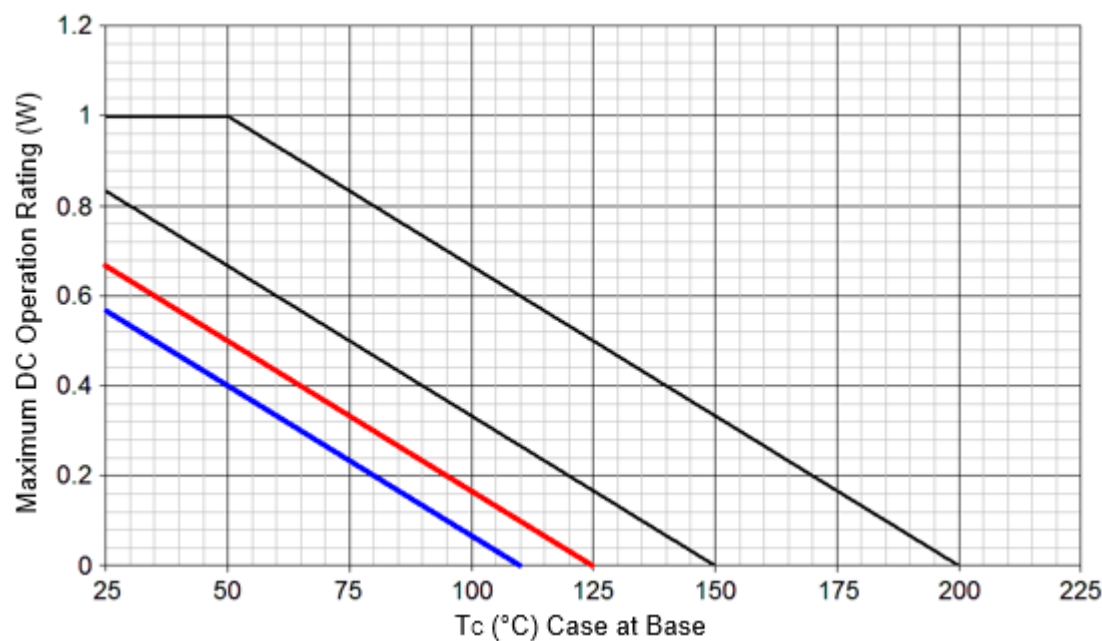
Figure 4-1. Temperature-Power Derating ( $R_{\theta JA}$ )<sup>1</sup>



**Note:**

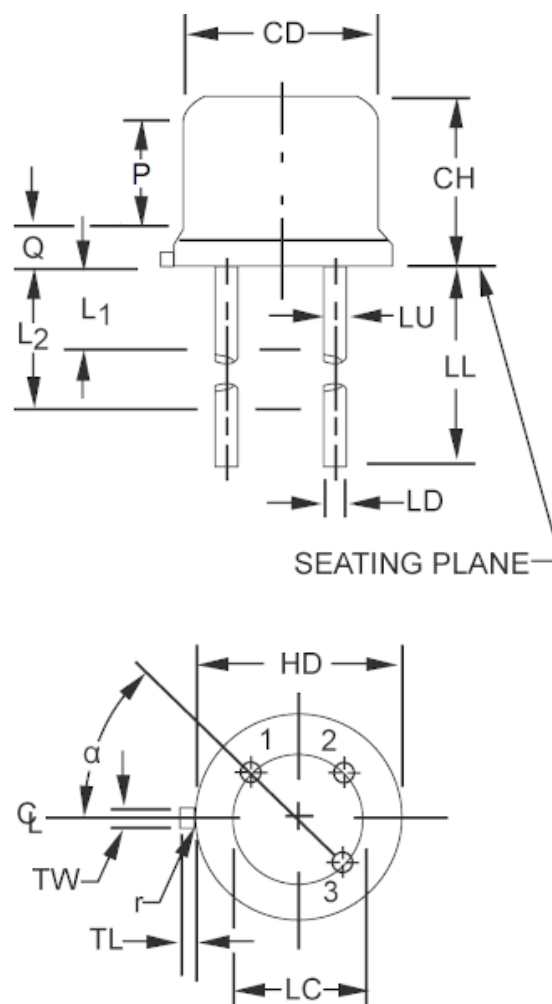
1. Leads = 0.125 inch (3.175 mm)

Figure 4-2. Temperature-Power Derating ( $R_{\theta JC}$ )



## 5. Package Dimensions

Figure 5-1. Package Dimensions



| Symbol | Dimensions |       |             |       | Note |
|--------|------------|-------|-------------|-------|------|
|        | Inch       |       | Millimeters |       |      |
|        | Min.       | Max.  | Min.        | Max.  |      |
| CD     | 0.178      | 0.195 | 4.52        | 4.95  | —    |
| CH     | 0.170      | 0.210 | 4.32        | 5.33  | —    |
| HD     | 0.209      | 0.230 | 5.31        | 5.84  | —    |
| LC     | 0.100 TP   |       | 2.54 TP     |       | 6    |
| LD     | 0.016      | 0.021 | 0.41        | 0.53  | 7,8  |
| LL     | .500       | .750  | 12.70       | 19.05 | 7,8  |
| LU     | 0.016      | 0.019 | 0.41        | 0.48  | 7,8  |
| L1     | —          | 0.050 | —           | 1.27  | 7,8  |
| L2     | 0.250      | —     | 6.35        | —     | 7,8  |

.....continued

.....continued

| Symbol          | Dimensions |       |             |      | Note |
|-----------------|------------|-------|-------------|------|------|
|                 | Inch       |       | Millimeters |      |      |
|                 | Min.       | Max.  | Min.        | Max. |      |
| P               | 0.100      | —     | 2.54        | —    | —    |
| Q               | —          | 0.030 | —           | 0.76 | 5    |
| TL              | 0.028      | 0.048 | 0.71        | 1.22 | 3,4  |
| TW              | 0.036      | 0.046 | 0.91        | 1.17 | 3    |
| r               | —          | 0.010 | —           | 0.25 | 10   |
| α               | 45° TP     |       | 45° TP      |      | 6    |
| 1, 2, 9, 11, 12 |            |       |             |      |      |

**Notes:**

1. Dimension are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TH shall be held for a minimum length of 0.011 inch (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. Leads at gauge plane 0.054 +0.001 –0.000 inch (1.37 +0.03 –0.00 mm) below seating plane shall be within 0.007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods or by the gauge and gauging procedure shown in [Figure 4-2](#).
7. Dimension LU applies between L<sub>1</sub> and L<sub>2</sub>. Dimension LD applies between L<sub>2</sub> and LL minimum. The diameter is uncontrolled in L<sub>1</sub> and beyond LL minimum.
8. All three leads
9. The collector shall be internally connected to the case.
10. Dimension r (radius) applies to both inside corners of tab.
11. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.
12. Lead 1 = emitter, lead 2 = base, lead 3 = collector

## 6. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

| Revision | Date    | Description                                                                                                                |
|----------|---------|----------------------------------------------------------------------------------------------------------------------------|
| A        | 06/2024 | Document was converted to Microchip template. Previous Microsemi literature number LDS-0263 was replaced with DS00005447A. |

## Microchip Information

### The Microchip Website

Microchip provides online support via our website at [www.microchip.com/](http://www.microchip.com/). This website is used to make files and information easily available to customers. Some of the content available includes:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip design partner program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

### Product Change Notification Service

Microchip's product change notification service helps keep customers current on Microchip products. Subscribers will receive email notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, go to [www.microchip.com/pcn](http://www.microchip.com/pcn) and follow the registration instructions.

### Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Embedded Solutions Engineer (ESE)
- Technical Support

Customers should contact their distributor, representative or ESE for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in this document.

Technical support is available through the website at: [www.microchip.com/support](http://www.microchip.com/support)

### Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip products:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip product is strictly prohibited and may violate the Digital Millennium Copyright Act.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is "unbreakable". Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.

### Legal Notice

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure

that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at [www.microchip.com/en-us/support/design-help/client-support-services](http://www.microchip.com/en-us/support/design-help/client-support-services).

THIS INFORMATION IS PROVIDED BY MICROCHIP "AS IS". MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP'S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

## Trademarks

The Microchip name and logo, the Microchip logo, Adaptec, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, CryptoMemory, CryptoRF, dsPIC, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Kleer, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AgileSwitch, ClockWorks, The Embedded Control Solutions Company, EtherSynch, Flashtec, Hyper Speed Control, HyperLight Load, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, Quiet-Wire, SmartFusion, SyncWorld, TimeCesium, TimeHub, TimePictra, TimeProvider, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, Augmented Switching, BlueSky, BodyCom, Clockstudio, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, EyeOpen, GridTime, IdealBridge, IGaT, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, IntelliMOS, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, MarginLink, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mSiC, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, Power MOS IV, Power MOS 7, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SmartHLS, SMART-I.S., storClad, SQL, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, Trusted Time, TSHARC, Turing, USBCheck, VariSense, VectorBlox, VeriPHY, ViewSpan, WiperLock, XpressConnect, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, and Symmcom are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2012–2024, Microchip Technology Incorporated and its subsidiaries. All Rights Reserved.

ISBN: 978-1-6683-4743-0

## Quality Management System

For information regarding Microchip's Quality Management Systems, please visit [www.microchip.com/quality](http://www.microchip.com/quality).

# Worldwide Sales and Service

| AMERICAS                                                                                                                                                                                                                                                                                               | ASIA/PACIFIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ASIA/PACIFIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | EUROPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Corporate Office</b><br>2355 West Chandler Blvd.<br>Chandler, AZ 85224-6199<br>Tel: 480-792-7200<br>Fax: 480-792-7277<br>Technical Support:<br><a href="http://www.microchip.com/support">www.microchip.com/support</a><br>Web Address:<br><a href="http://www.microchip.com">www.microchip.com</a> | <b>Australia - Sydney</b><br>Tel: 61-2-9868-6733<br><b>China - Beijing</b><br>Tel: 86-10-8569-7000<br><b>China - Chengdu</b><br>Tel: 86-28-8665-5511<br><b>China - Chongqing</b><br>Tel: 86-23-8980-9588<br><b>China - Dongguan</b><br>Tel: 86-769-8702-9880<br><b>China - Guangzhou</b><br>Tel: 86-20-8755-8029<br><b>China - Hangzhou</b><br>Tel: 86-571-8792-8115<br><b>China - Hong Kong SAR</b><br>Tel: 852-2943-5100<br><b>China - Nanjing</b><br>Tel: 86-25-8473-2460<br><b>China - Qingdao</b><br>Tel: 86-532-8502-7355<br><b>China - Shanghai</b><br>Tel: 86-21-3326-8000<br><b>China - Shenyang</b><br>Tel: 86-24-2334-2829<br><b>China - Shenzhen</b><br>Tel: 86-755-8864-2200<br><b>China - Suzhou</b><br>Tel: 86-186-6233-1526<br><b>China - Wuhan</b><br>Tel: 86-27-5980-5300<br><b>China - Xian</b><br>Tel: 86-29-8833-7252<br><b>China - Xiamen</b><br>Tel: 86-592-2388138<br><b>China - Zhuhai</b><br>Tel: 86-756-3210040 | <b>India - Bangalore</b><br>Tel: 91-80-3090-4444<br><b>India - New Delhi</b><br>Tel: 91-11-4160-8631<br><b>India - Pune</b><br>Tel: 91-20-4121-0141<br><b>Japan - Osaka</b><br>Tel: 81-6-6152-7160<br><b>Japan - Tokyo</b><br>Tel: 81-3-6880-3770<br><b>Korea - Daegu</b><br>Tel: 82-53-744-4301<br><b>Korea - Seoul</b><br>Tel: 82-2-554-7200<br><b>Malaysia - Kuala Lumpur</b><br>Tel: 60-3-7651-7906<br><b>Malaysia - Penang</b><br>Tel: 60-4-227-8870<br><b>Philippines - Manila</b><br>Tel: 63-2-634-9065<br><b>Singapore</b><br>Tel: 65-6334-8870<br><b>Taiwan - Hsin Chu</b><br>Tel: 886-3-577-8366<br><b>Taiwan - Kaohsiung</b><br>Tel: 886-7-213-7830<br><b>Taiwan - Taipei</b><br>Tel: 886-2-2508-8600<br><b>Thailand - Bangkok</b><br>Tel: 66-2-694-1351<br><b>Vietnam - Ho Chi Minh</b><br>Tel: 84-28-5448-2100 | <b>Austria - Wels</b><br>Tel: 43-7242-2244-39<br>Fax: 43-7242-2244-393<br><b>Denmark - Copenhagen</b><br>Tel: 45-4485-5910<br>Fax: 45-4485-2829<br><b>Finland - Espoo</b><br>Tel: 358-9-4520-820<br><b>France - Paris</b><br>Tel: 33-1-69-53-63-20<br>Fax: 33-1-69-30-90-79<br><b>Germany - Garching</b><br>Tel: 49-8931-9700<br><b>Germany - Haan</b><br>Tel: 49-2129-3766400<br><b>Germany - Heilbronn</b><br>Tel: 49-7131-72400<br><b>Germany - Karlsruhe</b><br>Tel: 49-721-625370<br><b>Germany - Munich</b><br>Tel: 49-89-627-144-0<br>Fax: 49-89-627-144-44<br><b>Germany - Rosenheim</b><br>Tel: 49-8031-354-560<br><b>Israel - Hod Hasharon</b><br>Tel: 972-9-775-5100<br><b>Italy - Milan</b><br>Tel: 39-0331-742611<br>Fax: 39-0331-466781<br><b>Italy - Padova</b><br>Tel: 39-049-7625286<br><b>Netherlands - Drunen</b><br>Tel: 31-416-690399<br>Fax: 31-416-690340<br><b>Norway - Trondheim</b><br>Tel: 47-72884388<br><b>Poland - Warsaw</b><br>Tel: 48-22-3325737<br><b>Romania - Bucharest</b><br>Tel: 40-21-407-87-50<br><b>Spain - Madrid</b><br>Tel: 34-91-708-08-90<br>Fax: 34-91-708-08-91<br><b>Sweden - Gothenberg</b><br>Tel: 46-31-704-60-40<br><b>Sweden - Stockholm</b><br>Tel: 46-8-5090-4654<br><b>UK - Wokingham</b><br>Tel: 44-118-921-5800<br>Fax: 44-118-921-5820 |